

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions of claims in the application.

1-3. (Cancelled).

4. (Currently amended): A method of producing a group III-nitride semiconductor substrate, essentially consisting of:

a first step of forming a low-temperature buffer layer consisting of

$B_xAl_yGa_zIn_{1-x-y-z}N$ ($0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$, $0 \leq 1-x-y-z \leq 1$), on a ZrB_2 single crystal base having a defect density of 10^7 cm^{-2} or less, at a base temperature which does not give an energy greater than a surface potential of said ZrB_2 single crystal base to a nitrogen atom arising from decomposition of buffer layer forming gas, allowing said low-temperature buffer layer to be grown or deposited on said ZrB_2 single crystal base substantially without creation of any $Zr-B-N$ amorphous nitrated layer as a result of diffusion and/or chemical bonding of the nitrogen atom, wherein said low-temperature buffer layer has a thickness in the range of 10 nm to 1 μm capable of suppressing the nitriding of the surface of said ZrB_2 single base, and said low-temperature buffer layer is formed as a single crystal at the time said first step is completed; and

a second step of successively to said first step, growing a single crystal film consisting of $B_aAl_bGa_cIn_{1-a-b-c}N$ ($0 \leq a \leq 1$, $0 \leq b \leq 1$, $0 \leq c \leq 1$, $0 \leq 1-a-b-c \leq 1$), directly on said low-temperature buffer layer, to form a semiconductor layer consisting of

$\text{Al}_a\text{Ga}_{1-a-b}\text{In}_b\text{N}$ ($0 \leq a \leq 1$, $0 \leq b \leq 1$, $0 \leq 1-a-b \leq 1$) which has an element-forming surface with a dislocation density of 10^7 cm^{-2} or less in its entirety.

5. (Cancelled)

6. (Currently amended): A method of producing a group III-nitride semiconductor substrate, essentially consisting of:

a first step of forming a low-temperature buffer layer consisting of

$\text{B}_x\text{Al}_y\text{Ga}_z\text{In}_{1-x-y-z}\text{N}$ ($0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$, $0 \leq 1-x-y-z \leq 1$) wherein said low-temperature buffer layer has a thickness in the range of 10 nm to 1 μm , on a ZrB_2 single crystal base having a defect density of 10^7 cm^{-2} or less, at a base temperature which does not give an energy greater than a surface potential of said ZrB_2 single crystal base to a nitrogen atom arising from decomposition of buffer layer forming gas, allowing said low-temperature buffer layer to be grown or deposited on said ZrB_2 single crystal base substantially without creation of any Zr – B – N amorphous nitrated layer as a result of diffusion and/or chemical bonding of the nitrogen atom, wherein said low-temperature buffer layer has a thickness in the range of 10 nm to 1 μm capable of suppressing the nitriding of the surface of said ZrB_2 single base; and

a second step of successively to said first step, growing a single crystal film consisting of $\text{B}_a\text{Al}_b\text{Ga}_c\text{In}_{1-a-b-c}\text{N}$ ($0 \leq a \leq 1$, $0 \leq b \leq 1$, $0 \leq c \leq 1$, $0 \leq 1-a-b-c \leq 1$), directly on said low-temperature buffer layer, to form a semiconductor layer consisting of

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$\text{Al}_a\text{Ga}_{1-a-b}\text{In}_b\text{N}$ ($0 \leq a \leq 1$, $0 \leq b \leq 1$, $0 \leq 1 - a - b \leq 1$) which has an element-forming surface with a dislocation density of 10^7 cm^{-2} or less in its entirety, wherein said low-temperature buffer layer is polycrystalline or amorphous at the time said first step is completed, and formed as a single-crystal at the time said second step is completed.

7. (Cancelled).